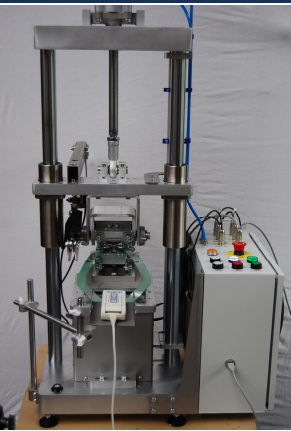


TEKSCAN PRESSURE MEASUREMENT ACCURACY FOR ORTHOPAEDIC BIOMECHANICAL JOINT CONTACT MEASUREMENTS

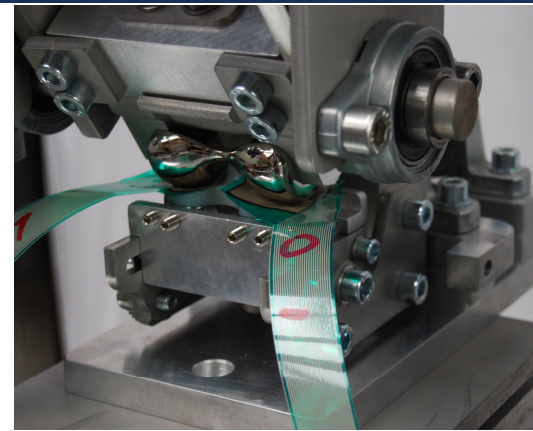
Herregodts, S., ir. ^{1,2} – Verstraete, M.A., PhD ^{1,2} – Victor, J., MD, PhD ¹
– De Baets, P., PhD ²

Dept. of Orthopaedics and Traumatology, Ghent University
Dept. of Mechanical Construction and Production, Ghent University



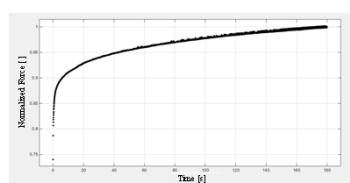
Multi-axial test rig properties
Compression testing
Biaxial testing
Adjustable degrees of freedom of specimens
Knee implant mounting

Multi-axial test rig capabilities
Research of the Tekscan sensor characteristics
Tekscan sensor automated calibration
Evaluation of knee implants: pressure distribution measurement and stability research

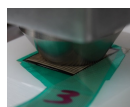


Aim of this study: Improve the accuracy and reliability of Tekscan intra-articular contact pressure measurements

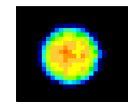
Sensor accuracy optimization technique



Automated sensor preconditioning and characterization
Preconditioning cycle improves the sensor output stability
Characterization of the sensor's step response allows for sensor drift compensating post-processing



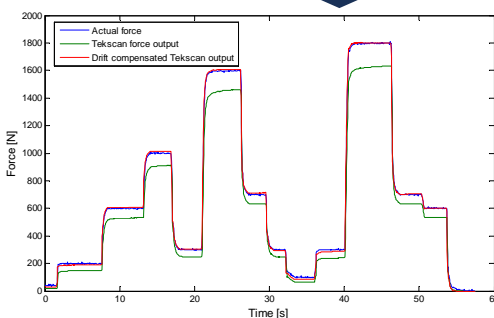
Automated multipoint calibration
Optimal contacting surfaces
Fully automated and synchronized process



Contact pressure measurements



Automated measurement data post-processing
Based on sensor specific behaviour and calibration data, sensor drift is eliminated during post-processing

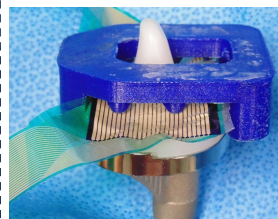


Drift compensation technique reduces average error during realistic loading from 15,6 % to 3,4 %

Sensor position measurement method

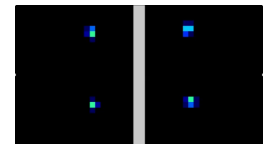


Sensor fixation to the implant



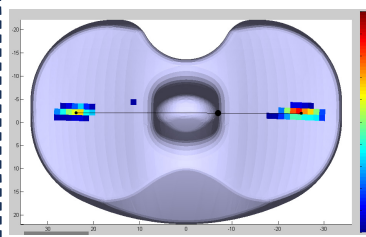
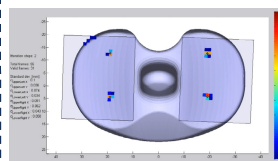
Measurement method

Implant specific 3D printed calibration block



Sensor position computation

Automated sensor position computation and visualization



Pressure distribution visualisation

Computation and visualization centres of pressure
Animated and synchronized visualization
Easy interpretation

Conclusions

Optimized sensor preconditioning, sensor specific characterization and calibration combined with advanced data post-processing results in a 5 times higher measurement accuracy.

Sensor position measurement allows for intuitive visualization and interpretation of measurement data.